Species Diversity, 2008, **13**, 117–122

A New Species of *Macrophthalmus* (Crustacea: Decapoda: Brachyura: Macrophthalmidae) from Iriomote Island, Ryukyu Islands, Japan

Tohru Naruse[1] and Takeharu Kosuge[2]

[1] *Raffles Museum of Biodiversity Research, Department of Biological Sciences, National University of Singapore, 14 Science Drive 4, Singapore 117543, Republic of Singapore*
E-mail: dbstn@nus.edu.sg
[2] *Uehara 870-277, Taketomi, Yaeyama, Okinawa 907-1541 Japan*

(Received 9 November 2006; Accepted 18 June 2008)

A new species of the sentinel crab genus *Macrophthalmus* is described from Iriomote Island, southwestern Ryukyu Islands, Japan. *Macrophthalmus ryukyuanus* sp. nov. is referred to the *M. telescopicus* species group, within which it is morphologically most similar to *M. milloti* Crosnier, 1965. The forms of the eye, male chela, and fourth ambulatory leg clearly distinguish the new species from the latter. The new species is also compared to *M. microfylacas* Nagai, Watanabe and Naruse, 2006 and *M. latipes* Borradaile, 1903. A key to the Japanese species of the *M. telescopicus* group is provided.

Key Words: Crustacea, Decapoda, Brachyura, Macrophthalmidae, *Macrophthalmus ryukyuanus*, new species, taxonomy.

Introduction

The *Macrophthalmus telescopicus* species group comprises nine species from the Indo-Pacific. The group is characterized by elongated ocular peduncles that usually extend beyond the external orbital angle. Most of its member species dwell in sublittoral environments (e.g., Borradaile 1903; Takeda and Komai 1991; Fransen 1998; Minemizu 2000; Nagai *et al.* 2006). During a recent survey made by the second author with the purpose of documenting the subtidal benthic fauna around the Yaeyama Islands in the southwestern Ryukyu Islands, two specimens of an undescribed species of the *M. telescopicus* group were collected. Preliminary examination showed that the undescribed species was morphologically similar to *M. milloti* Crosnier, 1965 and *M. microfylacas* Nagai, Watanabe and Naruse, 2006; howerver, it was distinctive in that the dactylus of the fourth ambulatory leg was slightly broadened. In the present report we describe this species and compare it in detail with allied congeners.

The specimens examined in this study are deposited in the Ryukyu University Museum, Fujukan, in Okinawa, Japan (RUMF); and the Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore (ZRC). The abbreviations CL, CW, G1, and G2 are used for carapace length, carapace width, male first gonopod, and male second gonopod, respectively. Comparison data of *M. microfylacas* and *M. milloti* are cited from Nagai *et al.* (2006).

Measurements follow Nagai *et al.* (2006). Ocular peduncle length indicates the length of the distal ocular peduncle segment including the cornea.

Taxonomic Account

Macrophthalmus (*Macrophthalmus*) *ryukyuanus* sp. nov.

[New Japanese name: Iriomote-menaga-osagani]

(Figs 1, 2)

Material examined. Holotype: male, CL 5.3 mm, CW 9.3 mm, ZRC 2007.0524, off mouth of Urauchi R., Iriomote I., Ryukyu Is, Japan (24°24.98′N, 123°46.04′E), 19 m depth, coll. T. Kosuge and K. Higa, dredge, 16 August 2005. Paratype: 1 male, CL 3.5 mm, RUMF-ZC-538, same data as holotype.

Description. *Holotype.* Carapace rectangular, widest across second anterolateral teeth, CW 1.75 times CL; dorsal surface rather uneven, cervical groove continuous with H-shaped gastric groove, oblique line of small granules on branchial region above base of fourth ambulatory leg (Fig. 1a). Front strongly constricted at base, directed slightly downwards. Supraorbital margin granulated, thinly margined, convex in dorsal view; infraorbital margin thinly margined, reaching laterally as far as outer quarter of orbit. External orbital angle acute, directed laterally;

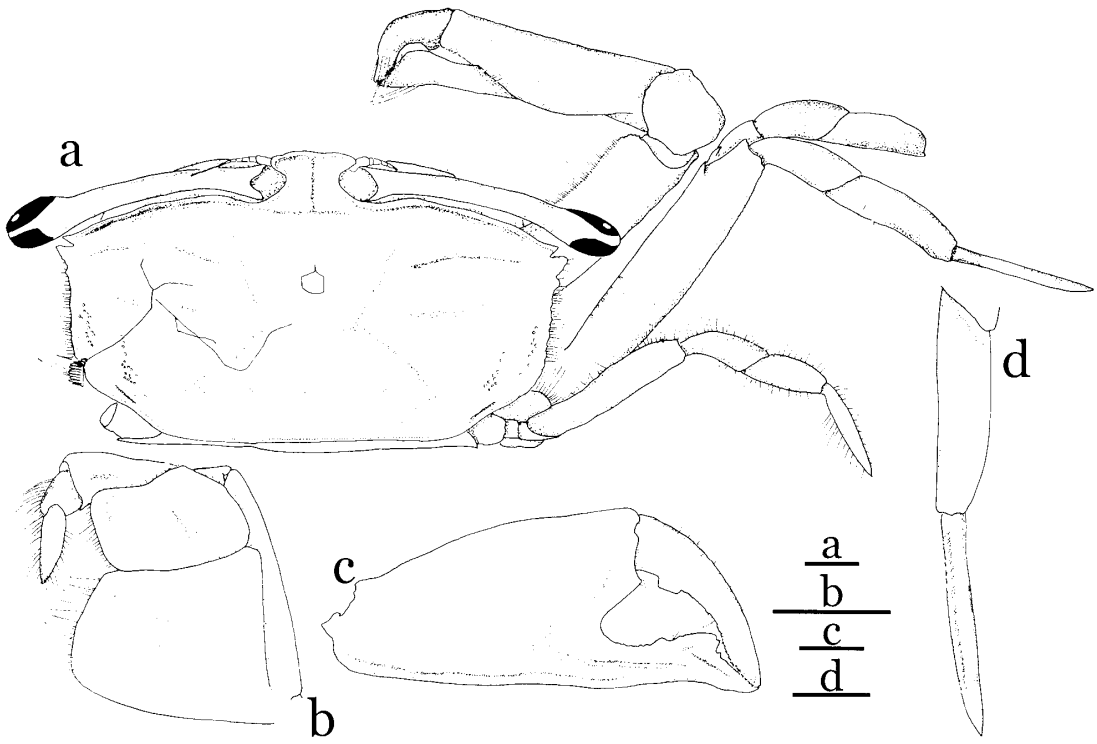

Fig. 1. *Macrophthalmus ryukyuanus* sp. nov., holotype male, ZRC 2007.0524. a, Habitus; b, left third maxilliped, ventral view; c, right chela, outer view; d, right second ambulatory leg, dorsal view. Scales: 1 mm.

anterolateral margin of carapace bearing 3 teeth including external orbital angle, second tooth largest, separated from first and third teeth by deep and shallow V-shaped notches, respectively; anterolateral teeth followed posteriorly by small, rounded granules, posterolateral margins subparallel. Posterior margin of epistome with very low convexity.

Antennule and antenna moderately developed. Eye with long ocular peduncle exceeding tip of external orbital angle by 21% of its length, i.e. by more than three-quarters of cornea in frontal view; ocular peduncle stouter distally, slightly curving backwards in dorsal view, its length about 56.1% of CW.

Third maxillipeds closing with rhomboidal medial gape; exopod long, distal end almost reaching anterior margin of merus; ischium squarish in shape, wider than long; merus smaller than ischium, about two-thirds length of ischium along midline (Fig. 1b).

Chelipeds subequal (Fig. 1c). Merus subtriangular in cross-section, lower inner margin fringed with fur of soft setae. Carpus small, rounded, its inner and outer margins lined by tiny granules. Chela large, length about three-quarters of CW; inner surface slightly convex, with short, granulated ridge extending from hinge with carpus; outer surface flat, covered with microscopic granules, upper margin rounded, lower margin gently keeled; fingers rather compressed laterally, tips acute; movable finger gradually curving downwards, with small, rectangular tooth on cutting edge subproximally; base of immovable finger placed proximal to that of movable finger, cutting edge with distally directed tooth, lower margin of immovable finger sinuous, convex at base, concave below subdistal tooth.

All ambulatory legs long, slender (as in all species of *Macrophthalmus*); meri of first to third ambulatory legs each with sharp subdistal tooth on anterior margin; dactyli of first to third ambulatory legs narrow, flat, slightly curved, longer than respective propodi (Fig. 1d). Fourth ambulatory leg short, outer margins of carpus to dactylus and inner margins of propodus and dactylus regularly lined with plumose setae, dactylus lanceolate with middle part slightly wider than proximal part.

Male abdomen 6-segmented; first and third segments wider than second, each with transverse ridge, that of first segment reaching lateral margins; sixth segment with prominent convexity on lateral margin proximally (Fig. 2a). Telson longer than sixth abdominal segment, rounded distally (Fig. 2a).

G1 slender, proximal half convex ventrally, proximomesial margin with small lamellar projection fringed with plumose setae (Fig. 2b); terminal process chitinous, directed dorsally (Fig. 2c). G2 small, with terminal opening and pair of distichous flaps (Fig. 2d).

Variation. Paratype male with relatively small chelipeds compared to holotype, and lower inner margin of merus of cheliped with only sparse setae, instead of holotype's tuft of soft setae.

Distribution and habitat. So far, this species is only known from the type locality, off the mouth of the Urauchi River, Iriomote Island, at a depth of 19 m on very fine sand.

Etymology. The species is named after the Ryukyu Islands, where the type locality (Iriomote Island) is located.

Remarks. An increase in the relative length of the ocular peduncle with increasing body size is generally observed in species of the *M. telescopicus* species

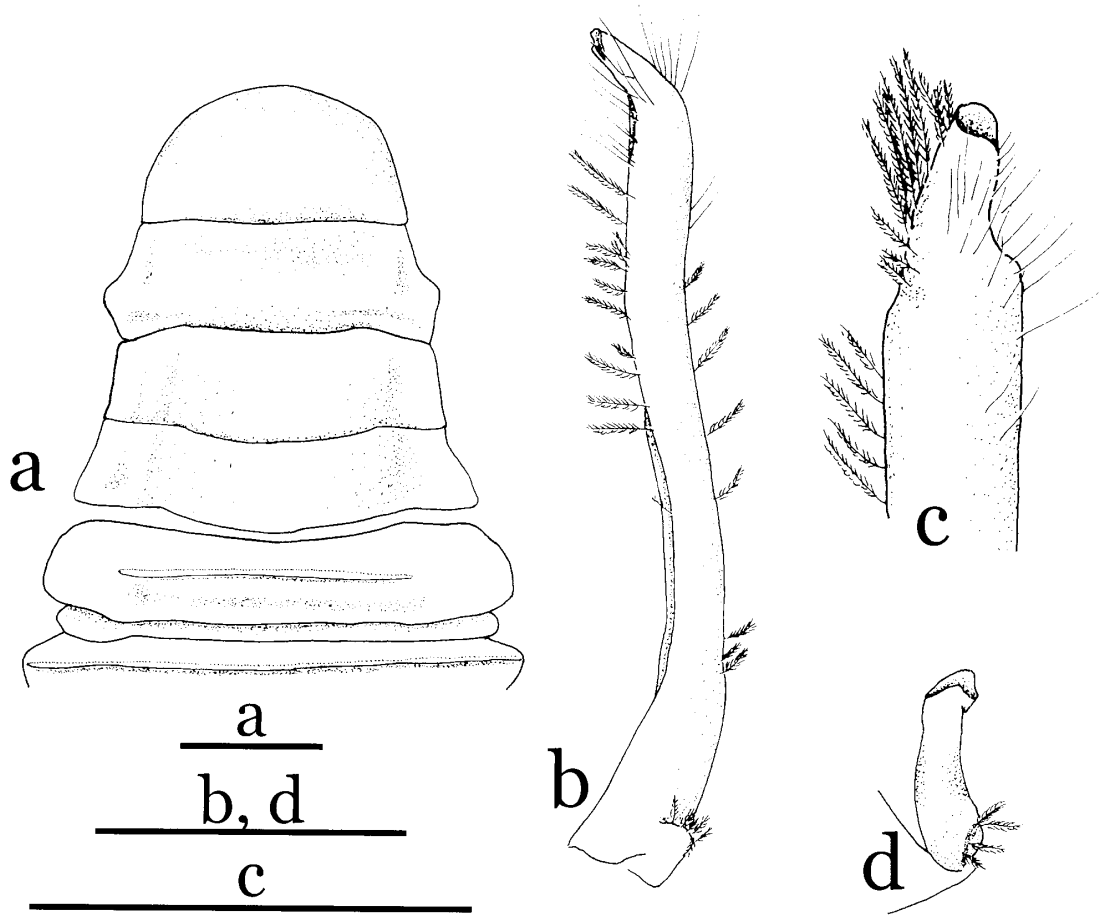

Fig. 2. *Macrophthalmus ryukyuanus* sp. nov., holotype male, ZRC 2007.0524. a, Abdomen and telson, ventral view; b, left G1, inner view; c, distal part of left G1, dorsal view; d, G2, ventral view. Scales: 1 mm.

group (see Nagai *et al.* 2006). The identification of small specimens is sometimes difficult because of this morphometric change. For the new species, we have obtained only two small males (3.5 and 5.3 mm in CL), but the holotype already possesses relatively large-sized chelae as well as an elongated G1. These features indicate that it has more or less attained its adult form, despite the presence of a, for this group, relatively short ocular peduncle.

In other respects, *M. ryukyuanus* is obviously assignable to the *M. telescopicus* species group, since the cornea reaches well beyond the external orbital angle of the carapace. Within this species group, *M. ryukyuanus* is distinguishable by the following suite of characters: a) the relatively short ocular peduncle (extending beyond the external orbital angle by just 21% of its length); b) the chela with a sinuous lower margin; and c) the relatively wide dactylus of the last ambulatory leg.

Macrophthalmus ryukyuanus and *M. milloti* share the common features of relatively short ocular peduncles and three anterolateral teeth on the carapace. The new species, however, can be differentiated easily from *M. milloti* by the following characters: a) a much shorter extra-orbital ocular peduncle length (about 21% of the ocular peduncle length vs. 26.3–35.7%); b) the sinuous lower margin of the im-

movable finger of the chela (vs. gently concave in *M. milloti*); c) a prominent concavity at the bases of the fingers of the cheliped (vs. only a narrow hiatus in *M. milloti*); d) the second anterolateral tooth being larger than the external orbital angle (vs. the converse in *M. milloti*); and e) the dorsally directed terminal process of G1 (vs. outwardly directed in *M. milloti*) (Crosnier 1965, figs 220, 222, 223, Pl. 11(4); Nagai *et al.* 2006, figs 4g, h, 6; present study).

The male chelae of *M. microfylacas* have a sinuous lower margin on the immovable finger, similar to the situation in *M. ryukyuanus*. *Macrophthalmus ryukyuanus*, however, differs from *M. microfylacas* in the following characters: a) a longer palm in the male chelae, b) a wider subproximal tooth of the movable finger in the male chelae, and c) the base of the immovable finger being placed proximal to the base of the dactylus (vs. placed at about the same level as the movable finger in *M. microfylacas*). Furthermore, *M. ryukyuanus* differs markedly from *M. microfylacas* in its shorter extra-orbital ocular peduncle length (about 21% of the ocular peduncle length vs. 44.1–58.6%) (Nagai *et al.* 2006, figs 2a, f, 4a, b, 6; present study).

Macrophthalmus ryukyuanus has a weakly broadened propodus and lanceolate dactylus of the fifth pereopod, somewhat similar to *M. latipes* Borradaile, 1903, which also has paddle-shaped fifth pereopods (Barnes 1973). Nevertheless, the new species can be easily distinguished from *M. latipes* in the following characters: a) a much narrower propodus and dactylus of the fifth pereopod, and b) a distinctly shorter ocular peduncle (extending beyond the external orbital angle by about 21% of its length vs. more than 40%) (Borradaile 1903, fig. 114; Barnes 1973, fig. 1C).

Key to Japanese species of the *Macrophthalmus telescopicus* species group

1. Ocular peduncle with a long terminal filament ····· *M. ceratophorus* Sakai, 1969
– Ocular peduncle without a terminal filament ····· 2
2. Ocular peduncle extending beyond external orbital angle by 0.21 of its length, with part of cornea not outside external orbital angle ····· *M. ryukyuanus* sp. nov.
– Ocular peduncle extending beyond external orbital angle by at least 0.26 of its length, with cornea completely outside external orbital angle ····· 3
3. Anterolateral margin of carapace with 4 teeth including external orbital angle ? ····· *M. philippinensis* Serène, 1971
– Anterolateral margin of carapace with 2 or 3 teeth including external orbital angle ····· 4
4. Ocular peduncle extending beyond tip of external orbital angle for less than 36% of its length and for less than two times length of cornea ····· *M. milloti* Crosnier, 1965
– Ocular peduncle extending beyond tip of external orbital angle for more than 38% of its length and for more than two times length of cornea ····· 5
5. Teeth on cutting edges of cheliped fingers not differentiated; lower margin of immovable finger concave ····· *M. telescopicus* (Owen, 1839)
– Teeth on cutting edges of cheliped fingers well differentiated; lower margin of immovable finger straight or convex ····· 6
6. Movable finger of male cheliped with rectangular tooth, distal margin of tooth halfway along cutting edge, mat of soft setae on inner surface not extending to cutting edge; second and third anterolateral teeth of carapace acuminate;

medium-sized species (maximum CL 11.2 mm, CW 18.9 mm) ..... *M. serenei* Takeda and Komai, 1991

– Movable finger of male cheliped with square tooth, distal margin of tooth at proximal 1/3 length cutting edge, mat of soft setae on inner surface extending to cutting edge; second and third anterolateral teeth of carapace lamellar; small-sized species (maximum CL 6.2 mm, CW 10.6 mm) ..... *M. microfylacas* Nagai, Watanabe and Naruse, 2006

Acknowledgements

We wish to thank Drs Tomoyuki Komai (Natural History Museum and Institute, Chiba, Japan), Peter Davie (Queensland Museum, Australia), Ng Ngan Kee (National University of Singapore), and other anonymous reviewers for their comments on our manuscript. We are grateful to Mr Koei Higa of the Research Vessel "Yaeyama" for his help in sampling. The first author thanks Prof. Peter K. L. Ng for access to museum facilities.

References

Barnes, R. S. K. 1973. A redescription of *Macrophthalmus latipes* Borradaile, 1903: an ocypodid crab with portunid-like paddles (Decapoda: Brachyura). Crustaceana 25: 292–296.

Borradaile, L. A. 1903. Marine crustaceans, 5. The crabs of the Catometopa families. Pp. 429–433. *In*: Gardiner, J. S. (Ed.) *The Fauna and Geography of the Maldive and Laccadive Archipelagoes, 1.* University Press, Cambridge.

Crosnier, A. 1965. Crustacés Décapodes Grapsidae et Ocypodidae. Faune de Madagascar 18: 1–143, pls 1–11.

Fransen, C. H. J. M. 1998. *Macrophthalmus* (*Macrophthalmus*) *ceratophorus* Sakai, 1969 (Crustacea: Decapoda: Brachyura: Ocypodidae) recorded from the Amirante Islands, western Indian Ocean. Zoologische Verhandelingen 323: 341–348.

Minemizu, R. 2000. *Marine Decapod and Stomatopod Crustaceans Mainly from Japan.* Bunichi Sogo Shuppan, Tokyo, 344 pp. [In Japanese]

Nagai, T., Watanabe, T. and Naruse, T. 2006. *Macrophthalmus* (*Macrophthalmus*) *microfylacas*, a new species of sentinel crab (Decapoda: Brachyura: Ocypodidae) from western Japan. Zootaxa 1171: 1–16.

Takeda, M. and Komai, T. 1991. Japanese species of the *Macrophthalmus telescopicus* complex (Crustacea: Decapoda: Brachyura: Ocypodidae). Bulletin of the National Science Museum, Tokyo, Series A 17: 165–171.